

Larwill Lake
Whitley County
2009 Fish Management Report

Rod A. Edgell, Assistant Fisheries Biologist



Fisheries Section
Indiana Department of Natural Resources
Division of Fish and Wildlife
I.G.C.-South, Room W273
402 W. Washington Street
Indianapolis, IN 46204

EXECUTIVE SUMMARY

- Larwill Lake is a 9-acre natural lake located southeast of Larwill in Whitley County, Indiana. Due to limited public access the lake has had no previous survey or management. An initial general fisheries survey was conducted in 2009 in order to document and assess the fishery.
- The general survey of Larwill Lake was conducted from June 15 to June 16, 2009. Temperature and oxygen profiles were collected at the deepest point using a Hydrolab Quanta®. Submersed aquatic plants were sampled on July 28, 2009 according to the Tier II Aquatic Vegetation Survey Protocol (IDNR 2007).
- On June 15 the water temperature was 72°F at the surface and a dissolved oxygen concentration greater than 3.0 ppm was present down to a depth of 10 feet. Submersed plants were recorded at a maximum depth of 7.5 feet, in July of 2008. Only two species, one native and one non-native were collected. Coontail was most common (frequency = 68%), followed by Eurasian watermilfoil (frequency = 5%).
- Fish collection effort consisted of 0.48 hours of pulsed D.C. night electrofishing with two dippers along the entire shoreline. Two trap nets and two experimental gill nets were set overnight.
- A total of 551 fish, weighing 253.74 pounds was collected during this survey. Bluegill was the most abundant species by number (33%), followed by gizzard shad (31%), and redear sunfish (17%). Gizzard shad was the most abundant species by weight (44%), followed by largemouth bass (35%), and carp (3%).
- A total of 182 bluegills, ranging in total length from 1.6 to 7.5, inches was collected. Bluegills of quality size (≥ 6 inches) comprised 1% of the entire sample.
- Ninety-five redear sunfish weighing 34.43 pounds were collected during the survey. Redear ranged in length from 4.6 to 9.5 inches with 80% of the catch measuring greater than or equal to 7 inches.
- Seventy-six largemouth bass were collected during the survey, ranging in length from 3.7 to 21.8 inches. Of the largemouth bass collected 62% were between 13.5 and 16 inches, and 58% were above the minimum size limit of 14 inches.
- Larwill Lake is currently providing good angling opportunities for several sport fish including redear sunfish and largemouth bass.
- The bluegill population at Larwill Lake is dominated by small, slow growing fish, which is typical of lakes with large gizzard shad populations. The small littoral zone and limited plant diversity may also be limiting sunfish abundance and growth, as the lake is very bowl shaped and shallow water habitat is scarce.

TABLE OF CONTENTS

	Page
LIST OF FIGURES	iv
INTRODUCTION	1
METHODS	1
RESULTS	1
DISCUSSION	2
RECOMMENDATIONS	3
LITERATURE CITED	3
APPENDIX.....	5

LIST OF FIGURES

Figure	Page
1. Sampling gear locations at Larwill Lake in June 2009 (GN = Gill Net, TN = Trap Net, and WC = Water Chemistry)	4

INTRODUCTION

Larwill Lake is a 9-acre natural lake located southeast of Larwill in Whitley County, Indiana. The lake is located in the Eel River watershed and has a maximum depth of 39 ft. The lake is primarily surrounded by agricultural fields and the entire shoreline is undeveloped. Although there is no state owned access, anglers can gain access through a county easement located on the east side of CR 700. Despite the limited amount of parking area anglers do use the site to launch boats and park cars. Due to limited public access the lake has had no previous survey or management. An initial general fisheries survey was conducted in 2009 in order to document and assess the fishery.

METHODS

The general survey of Larwill Lake was conducted from June 15 to June 16, 2009. Temperature and oxygen profiles were collected at the deepest point using a Hydrolab Quanta®. Submersed aquatic plants were sampled on July 28, 2009 according to the Tier II Aquatic Vegetation Survey Protocol (IDNR 2007). A Garmin™ global positioning system device was used to record the location of the water quality data collection site, aquatic vegetation sample sites, and fish collection sites.

Fish collection effort consisted of 0.48 h of pulsed D.C. night electrofishing with two dippers along the entire shoreline. Two trap nets and two experimental gill nets were set overnight (Figure 1). Total length of all fish was measured to the nearest 0.1 in and weight was measured to the nearest 0.01 lbs. Five scales per half-inch group were collected from bluegill, largemouth bass, and redear sunfish for age determination and back-calculated lengths-at-age. Length frequency distributions for reporting purposes were grouped in half-inch increments which are defined as X.0 – X.4 and X.5 – X.9. Age length keys were also constructed to determine mean lengths-at-age. Proportional stock density (PSD) and relative stock density (RSD) was calculated for bluegill and largemouth bass using electrofishing catch only (Anderson and Neumann 1996).

RESULTS

On June 15 the water temperature was 72°F at the surface and a dissolved oxygen concentration greater than 3.0 ppm was present down to a depth of 10 ft. Submersed plants were recorded at a maximum depth of 7.5 ft, in July of 2008. Only two species, one native and one

non-native were collected. Coontail was most common (frequency = 68%), followed by Eurasian watermilfoil (frequency = 5%).

A total of 551 fish, weighing 253.74 lbs was collected during this survey. Bluegill was the most abundant species collected by number (33%), followed by gizzard shad (31%), and redear sunfish (17%). Gizzard shad was the most abundant species collected by weight (44%), followed by largemouth bass (35%), and carp (3%).

A total of 182 bluegills, ranging in total length from 1.6 to 7.5 in was collected. The electrofishing and gill net catch rates were 144 fish/h and 56 fish/lift, respectively. The average electrofishing catch rate for Indiana natural lakes is 400 fish/h. The PSD for bluegill was 5. Bluegills of quality size (≥ 6 in) comprised 1% of the entire sample. Based on the age length key and back-calculated lengths-at-age the majority of bluegills reach 6 in between ages 4 and 5.

Gizzard shad were also collected in large numbers totaling 169 fish, weighing 126.18 lbs. The electrofishing, gill net, and trap net catch rates were 167 fish/h, 15 fish/lift, and 30 fish/lift, respectively. Ninety-seven percent of the gizzard shad collected were 11.0 in and larger.

Ninety-five redear sunfish weighing 34.43 lbs were collected during the survey. The electrofishing and trap net catch rates were 2 fish/h and 47 fish/lift. Redear ranged in length from 4.6 to 9.5 in with 80% of the catch measuring greater than or equal to 7 in. Based on the age length key and back-calculated lengths-at-age the majority of redear reach 7 in between ages 3 and 4.

Seventy-six largemouth bass were collected during the survey, ranging in length from 3.7 to 21.8 in. The electrofishing catch rate was 156 fish/h, slightly higher than the natural lakes average of 100 fish/h. The PSD for largemouth bass during this survey was 87. Of the largemouth bass collected 62% were between 13.5 and 16 in, and 58% were above the minimum size limit of 14 in. Based on the age length key and back calculated lengths at age the majority of largemouth bass reach 12 in between ages 4 - 5.

DISCUSSION

Larwill Lake is currently providing good angling opportunities for several sport fish primarily redear sunfish and largemouth bass. The redear population is dominated by harvestable size fish from the 2005 and 2006 year class. The abundance and growth of largemouth bass is above average, and the population is also dominated by large fish. Both

species are likely benefiting from low fishing pressure, while bass are taking advantage of a large prey base, which includes small bluegill and an abundance of gizzard shad.

While adult bass may be benefiting from gizzard shad, shad are likely negatively impacting other species such as bluegill by competing with them for food and space. The bluegill population at Larwill Lake is dominated by small, slow growing fish, which is typical of lakes with large gizzard shad populations. The small littoral zone and limited plant diversity may also be limiting sunfish abundance and growth, as their habitat is scarce.

RECOMMENDATIONS

- Despite the lakes size the DFW should make an effort to obtain a public access site on Larwill Lake if an opportunity becomes available. Due to the lack of public access no additional management actions are recommended at this time.
- The DFW and Larwill Lake residents should continue efforts to protect and conserve the natural shoreline and fish habitat at Larwill Lake.

LITERATURE CITED

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-481 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Indiana Department of Natural Resources. 2007. Tier II Aquatic Vegetation Survey Protocol. Indianapolis, Indiana.

Submitted by: Rod Edgell, Assistant Biologist

Date: 10/6/09

Approved by: Jed Pearson, Biologist

Date: 10/7/09

Approved by: Stu Shipman, Fisheries Supervisor

Date: 2/1/10



Figure 1. Sampling gear locations at Larwill Lake in June 2009 (GN = Gill Net, TN = Trap Net, and WC = Water Chemistry).

APPENDIX

Lake Pages

LAKE SURVEY REPORT

Type of Survey	<input checked="" type="checkbox"/> Initial Survey	<input type="checkbox"/> Re-Survey
----------------	--	------------------------------------

Lake Name	County	Date of survey (Month, day, year)
Larwill Lake	Whitley	6/15/2009
Biologist's name	Date of survey (Month, day, year)	
Rod Edgell	6/16/2009	

LOCATION		
Quadrangle Name	Range	Section
Lorane	31 N	3
Township Name	Nearest Town	
Larwill	Larwill	

ACCESSIBILITY					
State owned public access site			Privately owned public access site		Other access site
None					County Easment CR 700
Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
9	39	18.8	169		
Location of benchmark					

INLETS		
Name	Location	Origin
Unnamed Ditch	Northwest Shoreline	Agriculture Run-off

OUTLETS			
Name	Location		
Kaler Branch	South Shoreline		
Water level control			
Unknown			
POOL	ELEVATION (Feet MSL)	ACRES	Bottom type
TOP OF DAM			<input type="checkbox"/> Boulder
TOP OF FLOOD CONTROL POOL			<input type="checkbox"/> Gravel
TOP OF CONSERVATION POOL			<input checked="" type="checkbox"/> Sand
TOP OF MINIMUM POOL			<input checked="" type="checkbox"/> Muck
STREAMBED			<input checked="" type="checkbox"/> Clay
			<input type="checkbox"/> Marl

Watershed use
Agriculture
Development of shoreline
The entire shoreline is undeveloped. Ninety-five percent of the lake is surrounded by pasture and agriculture fields, and the remaining area is residential.
Previous surveys and investigations
None

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night Hours		Total Hours
			0.48		0.48
TRAP NETS	Number of Traps		Number of Lifts		Total Lifts
	2		1		2
GILL NETS	Number of Nets		Number of Lifts		Total Lifts
	2		1		2
ROTENONE	Gallons	ppm	Acre-feet Treated	SHORELINE SEINING	Number of 100 ft Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS					
Color	Turbidity (Secchi Disk)			Air Temperature	79.0 F
	6	Feet	0	Inches	Water temperature 71.6 F
Water Chemistri GPS Coordinates		N	41.1720574	W	-85.6223176

WATER QUALITY PARAMETERS															
DEPTH (Feet)	Degrees (F)	D.O.	SpC	pH	TDS	D.O.%	Turb.	DEPTH	Degrees (F)	D.O.	SpC	pH	TDS	D.O.%	Turb.
SURFACE	71.6	8.4	0.397	8.5	0.3	86.3		52							
2	71.6	8.1	0.396	8.5	0.3	82.5		54							
4	71.4	8	0.397	8.4	0.3	81.6		56							
6	70.1	7.6	0.397	8.3	0.3	77		58							
8	69.2	6.6	0.397	8.2	0.3	65.8		60							
10	66.8	4.2	0.395	7.9	0.3	40.9		62							
12	63.9	1.1	0.388	7.7	0.3	0		64							
14	62.5	0	0.385	7.6	0.3	0		66							
16	59.8	0	0.383	7.6	0.3	0		68							
18								70							
20								72							
22								74							
24								76							
26								78							
28								80							
30								82							
32								84							
34	44.6	0	0.438	7.4	0.3	0		86							
36								88							
38								90							
40								92							
42								94							
44								96							
46								98							
48								100							
50															
COMMENTS															
C=(F-32)*0.5555															

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake: Larwill	Secchi(ft): 4.0	SE Mean species / site: 0.12
Date: 7/28/2009	Littoral sites with plants: 14	Mean natives / site: 0.70
Littoral Depth (ft): 7.5	Number of species: 2	SE Mean natives / site: 0.11
Littoral Sites: 19	Maximum species / site: 2	Species diversity: 0.12
Total Sites: 20	Mean species / site: 0.75	Native diversity: 0.00

Species	Frequency of	Score Frequency				Dominance
	Occurrence	0	1	3	5	
Coontail	70.0	30.0	25.0	20.0	25.0	42.0
Eurasian watermilfoil	5.0	95.0	5.0	0.0	0.0	1.0

Filamentous Algae 70.0

Other species noted:

Occurrence and Abundance of Submersed Aquatic Plants - 0 to 5 ft.

Lake: Larwill	Secchi(ft): 4.0	SE Mean species / site: 0.13
Date: 7/28/2009	Littoral sites with plants: 8	Mean natives / site: 0.70
Littoral Depth (ft): 7.5	Number of species: 2	SE Mean natives / site: 0.15
Littoral Sites: 10	Maximum species / site: 1	Species diversity: 0.22
Total Sites: 10	Mean species / site: 0.80	Native diversity: 0.00

Species	Frequency of	Score Frequency				Dominance
	Occurrence	0	1	3	5	
Coontail	70.0	30.0	30.0	20.0	20.0	38.0
Eurasian watermilfoil	10.0	90.0	10.0	0.0	0.0	2.0

Filamentous Algae 80.0

Other species noted:

Occurrence and Abundance of Submersed Aquatic Plants - 5 to 10 ft.

Lake: Larwill	Secchi(ft): 4.0	SE Mean species / site: 0.15
Date: 7/28/2009	Littoral sites with plants: 7	Mean natives / site: 0.70
Littoral Depth (ft): 7.5	Number of species: 1	SE Mean natives / site: 0.15
Littoral Sites: 9	Maximum species / site: 1	Species diversity: 0.00
Total Sites: 10	Mean species / site: 0.70	Native diversity: 0.00

	Frequency of	Score Frequency				
Species	Occurrence	0	1	3	5	Dominance
Coontail	70.0	30.0	20.0	20.0	30.0	46.0
Eurasian watermilfoil	0.0	100.0	0.0	0.0	0.0	0.0
Filamentous Algae	60.0					

Other species noted:

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT						
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)		WEIGHT (pounds)	PERCENT
			minimum	maximum		
Bluegill	182	33.0	1.6	7.5	8.59	3.0
Gizzard shad	169	30.7	5.4	15.8	126.18	43.8
Redear sunfish	95	17.2	4.6	9.5	34.43	11.9
Largemouth bass	75	13.6	3.7	21.8	99.48	34.5
Black crappie	10	1.8	2.8	9.8	0.88	0.3
Yellow bullhead	6	1.1	8.1	12.3	3.65	1.3
Yellow perch	5	0.9	6	8.6	0.82	0.3
Warmouth	4	0.7	3.1	6.4	0.49	0.2
Brown bullhead	2	0.4	10	11.7	1.34	0.5
White sucker	1	0.2	16.5	16.5	1.83	0.6
Common carp	1	0.2	27.6	27.6	9.87	3.4
Hybrid sunfish	1	0.2	9.4	9.4	0.61	0.2
Total (11 species)	551	100.0			288.17	100.0

*Common names of fishes recognized by the American Fisheries Society.

Lake:	Larwill				TN	GN	EF
Date:	6/15/2009	to	6/16/2009		Total #	111	2
Species:	Bluegill				Effort	2	2
Total number:	182				CPUE	56	1
Total weight:	8.59						144
Length range:	1.6	to	7.5				

Group	TL (in)	TN	GN	EF	TOTAL	RSD
Stock	3	105	2	61	168	-
Quality	6	2	1	3	6	5
Preferred	8	0	0	0	0	
Memorable	10	0	0	0	0	
Trophy	12	0	0	0	0	

Length group (in)	TN	GN	EF	Total	Mean weight (lbs)	Length group (in)	TN	GN	EF	Total	Mean weight (lbs)
1.0						17.5					
1.5			1	1	0.00	18.0					
2.0	1		4	5	0.00	18.5					
2.5	5		3	8	0.01	19.0					
3.0	22		12	34	0.02	19.5					
3.5	27		26	53	0.03	20.0					
4.0	29	1	12	42	0.05	20.5					
4.5	13		5	18	0.07	21.0					
5.0	9		2	11	0.09	21.5					
5.5	3		1	4	0.12	22.0					
6.0						22.5					
6.5	1			1	0.23	23.0					
7.0	1	1	2	4	0.26	23.5					
7.5			1	1	0.33	24.0					
8.0						24.5					
8.5						25.0					
9.0						25.5					
9.5						26.0					
10.0						26.5					
10.5						27.0					
11.0						27.5					
11.5						28.0					
12.0						28.5					
12.5						29.0					
13.0						29.5					
13.5						30.0					
14.0						30.5					
14.5						31.0					
15.0						31.5					
15.5						32.0					
16.0						32.5					
16.5						33.0					
17.0						33.5					

Lake:	Larwill			TN	GN	EF
Date:	6/15/2009	to	6/16/2009	Total #	60	29
Species:	Gizzard shad			Effort	2	2
Total number:	169			CPUE	30	15
Total weight:	126.18					167
Length range:	5.4	to	15.8			

Group	TL (in)	TN	GN	EF	TOTAL	RSD
Stock	7	60	25	79	164	-
Quality	11	60	25	79	164	100
Preferred						
Memorable						
Trophy						

Length group (in)	TN	GN	EF	Total	Mean weight (lbs)	Length group (in)	TN	GN	EF	Total	Mean weight (lbs)
1.0						17.5					
1.5						18.0					
2.0						18.5					
2.5						19.0					
3.0						19.5					
3.5						20.0					
4.0						20.5					
4.5						21.0					
5.0		1		1	0.07	21.5					
5.5		1	1	2	0.07	22.0					
6.0		2		2	0.09	22.5					
6.5						23.0					
7.0						23.5					
7.5						24.0					
8.0						24.5					
8.5						25.0					
9.0						25.5					
9.5						26.0					
10.0						26.5					
10.5						27.0					
11.0	1			1	0.43	27.5					
11.5						28.0					
12.0		1	4	5	0.58	28.5					
12.5	10		20	30	0.61	29.0					
13.0	16	7	28	51	0.71	29.5					
13.5	24	10	17	51	0.80	30.0					
14.0	4	5	4	13	0.92	30.5					
14.5	2	2	3	7	1.01	31.0					
15.0	3			3	1.22	31.5					
15.5			3	3	1.41	32.0					
16.0						32.5					
16.5						33.0					
17.0						33.5					

Lake:	Larwill			TN	GN	EF
Date:	6/15/2009	to	6/16/2009	Total #	94	0
Species:	Redear sunfish			Effort	2	2
Total number:	95			CPUE	47	0
Total weight:	34.43					2
Length range:	4.6	to	9.5			

Group	TL (in)	TN	GN	EF	TOTAL	RSD
Stock	4	94	0	1	95	-
Quality	7	76	0	1	77	100
Preferred	9	6	0	0	6	
Memorable	11	0	0	0	0	
Trophy	13	0	0	0	0	

Length group (in)	TN	GN	EF	Total	Mean weight (lbs)	Length group (in)	TN	GN	EF	Total	Mean weight (lbs)
1.0						17.5					
1.5						18.0					
2.0						18.5					
2.5						19.0					
3.0						19.5					
3.5						20.0					
4.0						20.5					
4.5	3			3	0.07	21.0					
5.0						21.5					
5.5	1			1	0.16	22.0					
6.0	5			5	0.18	22.5					
6.5	9			9	0.24	23.0					
7.0	12			12	0.30	23.5					
7.5	14		1	15	0.35	24.0					
8.0	34			34	0.41	24.5					
8.5	10			10	0.48	25.0					
9.0	5			5	0.56	25.5					
9.5	1			1	0.55	26.0					
10.0						26.5					
10.5						27.0					
11.0						27.5					
11.5						28.0					
12.0						28.5					
12.5						29.0					
13.0						29.5					
13.5						30.0					
14.0						30.5					
14.5						31.0					
15.0						31.5					
15.5						32.0					
16.0						32.5					
16.5						33.0					
17.0						33.5					

Lake:	Larwill				TN	GN	EF
Date:	6/15/2009	to	6/16/2009	Total #	0	1	75
Species:	Largemouth bass			Effort	2	2	0.48
Total number:	76			CPUE	0	1	156
Total weight:	100.7						
Length range:	3.7	to	21.8				

Group	TL (in)	TN	GN	EF	TOTAL	RSD
Stock	8	0	1	67	68	-
Quality	12	0	1	58	59	87
Preferred	15	0	1	20	21	30
Memorable	20	0	0	1	1	1
Trophy	25	0	0	0	0	

Length group (in)	TN	GN	EF	Total	Mean weight (lbs)	Length group (in)	TN	GN	EF	Total	Mean weight (lbs)
1.0						17.5			1	1	2.79
1.5						18.0					
2.0						18.5			1	1	3.81
2.5						19.0					
3.0						19.5					
3.5			1	1	0.02	20.0					
4.0			1	1	0.03	20.5					
4.5						21.0					
5.0			2	2	0.06	21.5			1	1	5.99
5.5			2	2	0.08	22.0					
6.0			2	2	0.11	22.5					
6.5						23.0					
7.0						23.5					
7.5						24.0					
8.0						24.5					
8.5						25.0					
9.0						25.5					
9.5						26.0					
10.0			2	2	0.47	26.5					
10.5			2	2	0.53	27.0					
11.0			1	1	0.67	27.5					
11.5			4	4	0.71	28.0					
12.0			8	8	0.80	28.5					
12.5			1	1	0.90	29.0					
13.0						29.5					
13.5			6	6	1.28	30.0					
14.0			10	10	1.37	30.5					
14.5			13	13	1.58	31.0					
15.0			12	12	1.77	31.5					
15.5		1	3	4	1.91	32.0					
16.0			2	2	2.02	32.5					
16.5						33.0					
17.0						33.5					

Back-calculated lengths-at-age for bluegill captured at Larwill Lake in June 2009.

Year Class	# Aged	Age					
		1	2	3	4	5	6
2008	9	1.8					
	SD	0.3					
2007	16	1.7	3.0				
	SD	0.3	0.4				
2006	9	1.9	3.0	4.1			
	SD	0.4	0.3	0.4			
2005	4	1.8	2.8	4.1	5.1		
	SD	0.4	0.3	0.9	1.1		
2004	3	1.9	3.4	4.7	6.0	6.7	
	SD	0.3	0.6	0.2	0.2	0.4	
2003	1	1.5	2.6	3.9	5.4	6.6	7.3
	SD						
Mean*		1.8	3.0	4.3	5.6	6.7	
SD		0.3	0.4	0.5	0.7	0.4	
NL Mean		1.7	3.1	4.7	6.1	6.9	7.4

*Does not include age groups with less than three samples.

Age-length key for bluegill captured at Larwill Lake in June 2009.

Length Group	# in sample	# (age) in subsample	Age					
			1	2	3	4	5	6
1.0								
1.5	1	1(1)	1					
2.0	5	3(1)	5					
2.5	8	5(1)	8					
3.0	34	5(1)	34					
3.5	53	5(2)		53				
4.0	42	5(2)		42				
4.5	18	1(2), 4(3)		4	14			
5.0	11	3(3), 2(4)			7	4		
5.5	4	2(3), 1(4)			3	1		
6.0								
6.5	1	1(5)					1	
7.0	4	1(4), 2(5)				1	3	
7.5	1	1(6)						1
Mean TL			3.0	4.0	5.0	5.7	7.1	7.8
SE			0.1	0.0	0.1	0.3	0.1	

Back-calculated lengths-at-age for redear sunfish captured at Larwill Lake in June 2009.

Year Class	# Aged	Age					
		1	2	3	4	5	6
2008	0						
	SD						
2007	4	2.0	4.1				
	SD	0.1	0.3				
2006	19	1.8	4.2	6.6			
	SD	0.3	0.8	0.8			
2005	11	2.0	4.6	7.0	8.0		
	SD	0.2	1.0	1.0	0.6		
2004	2	1.9	4.9	7.5	8.9	9.3	
	SD	0.0	0.2	0.3	0.1	0.0	
2003	4	2.1	4.6	6.3	7.7	8.7	9.1
	SD	0.7	1.3	0.9	0.5	0.1	0.2
Mean*		2.0	4.4	6.6	7.8	8.7	9.1
SD		0.3	0.8	0.9	0.5	0.1	0.2

*Does not include age groups with less than three samples.

Age-length key for redear sunfish captured at Larwill Lake in June 2009.

Length Group	# in sample	# (age) in subsample	Age					
			1	2	3	4	5	6
1.0								
1.5								
2.0								
2.5								
3.0								
3.5								
4.0								
4.5	3	3(2)		3				
5.0								
5.5	1	1(2)		1				
6.0	5	5(3)			5			
6.5	9	5(3)			9			
7.0	12	4(3), 1(4)			10	2		
7.5	15	2(3), 3(4)			6	9		
8.0	34	3(3), 2(4)			20	14		
8.5	10	5(4)				10		
9.0	5	1(5), 4(6)					1	4
9.5	1	1(5)					1	
Mean TL				5.0	7.5	8.2	9.5	9.3
SE				0.3	0.1	0.1	0.3	0.0

Back-calculated lengths-at-age for largemouth bass captured at Larwill Lake in June 2009.

Year Class	# Aged	Age							
		1	2	3	4	5	6	7	8
2008	8	4.5							
	SD	1.0							
2007	3	4.8	9.4						
	SD	1.1	0.9						
2006	9	3.6	8.7	11.5					
	SD	0.6	0.6	0.5					
2005	9	4.2	7.7	10.2	12.8				
	SD	0.8	0.9	1.2	0.8				
2004	11	4.2	8.5	11.3	13.1	14.3			
	SD	0.8	0.5	0.7	0.7	0.6			
2003	7	3.9	7.6	10.4	12.1	13.9	15.2		
	SD	0.8	1.0	1.2	1.4	0.9	1.1		
2002	1	3.0	9.6	10.7	14.4	15.5	16.9	18.3	
	SD								
2001	1	2.9	8.2	11.3	13.1	15.8	17.1	19.3	21.0
	SD								
Mean*		4.2	8.4	10.8	12.7	14.1	15.2		
SD		0.8	0.8	0.9	1.0	0.8	1.1		
NL Mean		3.5	6.9	9.5	11.6	13.4	14.7		

Age-length key for largemouth bass captured at Larwill Lake in June 2009.

Length Group	# in sample	# (age) in subsample	Age							
			1	2	3	4	5	6	7	8
1.0										
1.5										
2.0										
2.5										
3.0										
3.5	1	1(1)	1							
4.0	1	1(1)	1							
4.5										
5.0	2	2(1)	2							
5.5	2	2(1)	2							
6.0	2	2(1)	2							
6.5										
7.0										
7.5										
8.0										
8.5										
9.0										
9.5										
10.0	2	1(2)		2						
10.5	2	1(1), 1(2)		1	1					
11.0	1	1(2)			1					
11.5	4	1(2), 2(3), 1(4)		1	2	1				
12.0	8	4(3), 1(4)			6	2				
12.5	1	1(3)			1					
13.0										
13.5	6	2(4), 2(5), 1(6)				2	2	1		
14.0	10	4(4)				10				
14.5	13	1(4), 3(5), 1(6)				3	8	2		
15.0	12	5(5)					12			
15.5	4	1(5), 3(6)					1	3		
16.0	2	1(6)						2		
16.5										
17.0										
17.5	1	1(6)						1		
18.0										
18.5	1	1(7)							1	
19.0										
19.5										
20.0										
20.5										
21.0										
21.5	1	1(8)								1
Mean TL			5.3	10.8	12.0	13.9	14.9	15.5	18.8	21.8
SE			0.3	0.4	0.2	0.2	0.1	0.4		

Sampling gear locations at Larwill Lake in in June 2009.

Gill Nets				
1	N	41.1717784	W	-85.6219908
2	N	41.1732496	W	-85.6229993

Trap Nets				
1	N	41.1734876	W	-85.6227097
2	N	41.1739688	W	-85.6243795